

CLAIMS

1. Optical device (1) including a cavity (2, 32) for which at least part is ellipsoidal with a first focus ( $F_1$ ,  $F'_1$ ) and a second focus ( $F_2$ ,  $F'_2$ ), the device including means of presenting a medium containing components to be analysed in the cavity at the first focus, the device also including means of transporting an excitation light beam in the cavity along a path also passing through the first focus to illuminate said medium at the first focus, said ellipsoidal part of the cavity (2, 32) including a wall reflecting light emitted by said medium in response to the excitation light beam, the device including means of collecting said emitted light at the second focus.

2. Optical device set forth in claim 1, characterised in that the means used to present said medium are capable of making the medium circulate along a path passing through the first focus.

3. Device set forth in claim 2, characterised in that the path of the means used to circulate the medium and the path of the means used to transport an excitation beam are orthogonal to each other at the first focus.

4. Optical device set forth in claim 2, characterised in that the angle between the path of the means used to circulate the medium and the path of the

means used to transport an excitation beam is less than  $90^\circ$  at the first focus.

5        5. Optical device set forth in any of claims 2 to 4, characterised in that the path of the means used to circulate the medium and the path of the means used to transport an excitation beam are both perpendicular to the axis of the ellipsoid corresponding to the ellipsoidal shape.

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6. Optical device set forth in any of claims 2 to 5, characterised in that the means used to circulate the medium include a transparent tube (7), at least at the first focus ( $F_1$ ).

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7. Optical device set forth in any of claims 2 to 5, characterised in that the means used to circulate the medium include an injector tube of the medium with one end located at the first focus and a collector tube of said medium with one end located at the other side of the first focus so that the medium is directly subjected to the excitation light beam.

25        8. Optical device set forth in either claim 6 or 7, characterised in that it is provided with orifices (4, 34) through which the tube (7) or injector tube and the collector tube can pass.

30        9. Optical device set forth in any of claims 1 to 8, characterised in that it is provided with an inlet orifice (3, 33) of the excitation light beam and

possibly an outlet orifice of the excitation light beam.

10           10. Optical device set forth in claim 1,  
5 characterised in that the means of presenting said medium include a case matching the shape of said part and wherein said medium can be housed at the first focus.

10           11. Optical device set forth in claim 10,  
characterised in that the case being transparent, the reflecting wall is the wall of said part.

15           12. Optical device set forth in claim 11,  
characterised in that the case is made of a material forming said reflecting wall.

20           13. Optical device set forth in claim 1,  
characterised in that the means of presenting said medium include a support including said medium and that  
can be inserted in the optical device to present said medium at the first focus.

25           14. Optical device set forth in claim 13,  
characterised in that the support includes at least one housing to contain said medium.

30           15. Optical device set forth in claim 13,  
characterised in that the support includes at least one channel internal to the support to transport said

medium to the first focus, in a transparent part of the support.

16. Optical device set forth in any of claims 13  
5 to 15, characterised in that said support is a lab on a chip.

17. Optical device set forth in claim 1,  
characterised in that the means of presenting said  
10 medium comprise a support provided in the cavity and supporting said medium so as to present it to the first focus.

18. Optical device set forth in any of claims 2 to  
15 9 and 13 to 17, characterised in that the cavity is completely filled with a substance transparent to the excitation light beam and to said emitted light, the means for collecting emitted light comprising an opening provided with a concave lens concave towards  
20 the outside of the device, for which the focal point coincides with the second focus located outside the optical device, and the axis of which is the axis of the ellipsoid corresponding to the ellipsoidal shape, the emitted light thus not passing through any air  
25 layer before coming out of the concave lens.

19. Optical device set forth in any of claims 1 to  
17, characterised in that the emitted light collection means include an opening (5) to allow light collected  
30 at the second focus to pass through.

20. Optical device set forth in any of claims 1 to 17, characterised in that the emitted light collection means include an opening equipped with a lens or a group of lenses (36, 37), the axis of which is the axis of the ellipsoid (A') corresponding to the ellipsoidal shape and for which the focal point coincides with the second focus ( $F'_2$ ).

21. Optical device set forth in claim 20, characterised in that the lens or group of lenses (36, 37) is placed in a reception housing of the device and is fixed to the device by a support element (38).

22. Optical device set forth in any of claims 1 to 21, characterised in that it consists of at least two assembled parts (31, 35).

23. Optical device set forth in claim 22, characterised in that one of the parts include the ellipsoidal part, the shape of the other part being chosen from among spherical, paraboloid, hyperboloid and ellipsoid shapes, to complete the cavity.

24. Optical device set forth in any of claims 1 to 23, characterised in that it is made of a metallic material.

25. Optical device set forth in any of claims 1 to 23, characterised in that it is made of a plastic material, the reflecting wall of the cavity being formed of a metallic material.

26. Optical device set forth in either claim 24 or  
25, characterised in that the metallic material absorbs  
light at the wavelength of the excitation light beam  
5 and reflects light at the wavelength of the emitted  
light.